



Year 12 Chemistry Tutorial 9.3.B – Acid/Base Identification

Module 9.3 – The Acidic Environment

Topic 9.3.B – Acid/Base Identification

Name

Date

1. The table below shows the colours of a number of different indicators.

Indicator	pH												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Thymol blue	Red	Grey	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Bromocresol green	Yellow	Yellow	Yellow	Grey	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
Bromocresol purple	Yellow	Yellow	Yellow	Yellow	Yellow	Grey	Purple	Purple	Purple	Purple	Purple	Purple	Purple
Universal indicator	Red	Red	Red	Red	Yellow	Yellow	Green	Blue	Blue	Purple	Purple	Purple	Purple
Alizarin yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Grey	Purple	Purple
Litmus	Pink	Pink	Pink	Pink	Pink	Grey	Grey	Grey	Blue	Blue	Blue	Blue	Blue

The grey shading represents when the pH is changing.

At which pH do the following changes occur?

- a) Alizarin yellow going from yellow to violet?

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- b) Universal indicator from yellow to green?

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2. Using the information in the table above, complete the table below.

Aqueous Solution	Colour in Indicator				pH of solution	Acid or base?
	Thymol blue	Litmus	Alizarin yellow	Universal indicator		
KOH	Yellow	Blue	Purple	Purple		
NaCl	Yellow	Grey	Yellow	Green		
HCl	Red	Pink	Yellow	Red		
CH ₃ COOH	Yellow	Pink	Yellow	Red		
Ca(OH) ₂	Yellow	Blue	Grey	Purple		

a) Which solution is the most acidic?

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b) Which solution is the most alkaline?

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c) Which solution(s) is/are neutral?

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3. During their chemistry course, students tested a known acid, a known base and water with samples of liquids extracted from various sources. The results are shown in the table below.

Liquid Extract Sample	Colour of Liquid Sample	Colour of Liquid in Water	Colour of Liquid in Acid	Colour of Liquid in Base
P	Pink	Pale pink	Pale pink	Orange
Q	Purple	Light Purple	Red	Green
R	Green	Green	Purple	Green
S	Yellow	Yellow	Yellow	Yellow

The students correctly concluded that only one of the samples could be used as an acid/base indicator. Which sample did the students choose and why?

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4. Plant growth is affected by soils that are too acidic or too basic. Table 1 shows the pH range of a number of indicators. Table 2 shows soil pH values below which the growth of the listed plants is restricted.

Table 1

Indicator	Colour (low pH – high pH)	Approximate pH range
Bromocresol green	yellow – blue	3.8 – 5.4
Methyl red	pink – yellow	4.4 – 6.2
Bromothymol blue	yellow – blue	6.0 – 7.6
Phenol red	yellow – red	6.8 – 8.4
Phenolphthalein	colourless – red	8.3 – 10.0
Alizarin yellow	yellow – lilac	10.1 – 12.0
Thymol blue	red - yellow	1.2 – 2.8

Table 2

Crop	pH
Potatoes	4.9
Apples	5.0
Cabbages	5.4
Wheat	5.5
Beans	6.0
Lettuces	6.1

Explain how indicators could be used to check whether the pH of a soil in a particular area is suited for growing wheat. In your answer identify which indicator(s) could be used and justify your choice.

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5. Outline an investigation using any of the indicators listed below to identify the smallest pH range of normal rainwater (thought to have a pH of about 5.6). Predict the results for your investigation and the pH range this indicates.

Indicator	Colour in low pH	pH change	Colour in high pH
Methyl orange	Red	3.1 – 4.4	Yellow
Bromothymol blue	Yellow	6.0 – 7.6	Blue
Phenolphthalein	Colourless	8.3 – 10	Pink

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